



M A G M A C O P P E R C O M P A N Y

Rec'd
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FLORENCE PROJECT

October 23, 1995

Jose Luis Gutierrez
Environmental Engineer W-6-2
Environmental Protection Agency
Region 9
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Jose,

The following two publications are included for you review:

1. "In-Situ Recovery of Minerals II" Edited by S.A. Swan and K.R. Coyne
2. "International Symposium of Class V Injection Well Technology", Proceeding sponsored by UIPC, September 24, 1987 Washington DC

These are my only copies, so please return them after your review. The second publication is on Class V wells, but does include some information on Copper leaching and groundwater monitoring history of those types of operations. Steve Mellon is sending you a series of articles on in-situ leaching under separate cover. I trust that this information will be of some use to you. You may also wish to call Bill Larson at the U.S. Bureau of Mines Twin Cities Research Center. Bill is the Project Coordinator at the Bureau for the Santa Cruz Joint Venture. He will be there until early January when he and his group will be released due to budgetary changes. I spoke with him and he is anxious to help out if he can. As he stated, they have a lot of in-situ institutional knowledge on Class III technology and there are familiar with permit requirement for copper in-situ leaching. They would be a good resource for you.

I have also included a table of analyses of the solutions that will be in the various ponds and open tanks on site. You will note that the solutions are sulfate based from the sulfuric acid used in the process. The ponds will be fenced to limit access. Birds may land occasionally, but are not usually seen on ponds of this type. They don't like the salt water, and they have other nearby fresh water sources to use, such as golf course, man made lakes, irrigation ditches etc. The Ashurst Dam is about 8-10 miles upstream and is riparian due to its constant flow there. The river is diverted into a series of canal at that point. The CAP canal, North Side canal, and Florence Coolidge canals are very close which provide more suitable places to land and feed.

Sincerely,

John T. Kline
Environmental Project Manager

**Magma Copper Company
Florence Project
Estimated Characteristics of Process Impoundment Solutions**

<u>Impoundment/Tank</u>	<u>Pregnant Leach and Raffinate Ponds</u>	<u>Evaporation/Salt Pond</u>	<u>Storm Water/Spill Control Tank</u>
Normal Condition	Always in use	Always in Use	Rarely used. Use during spills and storm events.
pH	1.7-2.2	6.5-7.2	6.5-8.5
Phosphorous, mg/l	60-100	Not Detected	0-100
Sulfate, g/l	90-110	40-110	0-100
Aluminum, g/l	8-10	35	0-10
Antimony, mg/l	<0.1	0.2	<0.1
Arsenic, mg/l	5-6	30	0-6
Barium, mg/l	<0.2	<1.0	<0.2
Calcium, g/l	0.5-0.7	0.2	0-0.7
Chromium, mg/l	4-9	120	0-9
Cobalt, mg/l	20-22	20-22	0-22
Copper, g/l	0.2-4.0	<1.0	0-4
Iron, g/l	1.5-2.0	<1	0-2
Lead, mg/l	<1	<1	<1
Magnesium	9-11	Saturated Magnesium sulfate	0-2
Manganese, mg/l	1-2	<1	0-2
Mercury, mg/l	<0.01	<0.01	<0.01
Nickel, mg/l	20-25	<1	0-25
Potassium, g/l	0.07-0.08	0.25	0-0.08
Selenium, mg/l	<0.1	<0.1	<0.1
Silver, mg/l	<0.01	<0.01	<0.01
Zinc, g/l	0.05-0.2	<0.2	0-0.2
TDS, g/l	90-120	Saturated magnesium sulfate	0-120
Estimated size, acres	<1	100	<0.1

Notes:

1. The evaporation pond will be equipped with evaporation sprayers which will deter birds from landing.
2. The run-off tank is used only in emergencies or during storm events and generally will be maintained empty.
3. Some analyses are listed in milligrams per liter (mg/100) and the other are listed in grams per liter (g/l).